

**WHAT IS CLAIMED**

1. A voltage transient compensation circuit for use with a DC-DC converter having a voltage output bus to which a load powered by said DC-DC converter is coupled, comprising:

a first switch circuit coupled between a voltage input bus and said voltage output bus and being operative, in response to a voltage on said voltage output bus dropping below a first threshold, to couple said voltage input bus to said voltage output bus, and thereby transfer energy from said voltage input bus to said voltage output bus and said load; and

a second switch circuit, coupled between said voltage output bus and a flyback circuit coupled to a reference voltage terminal and to said voltage input bus, and being operative, in response to a voltage on said voltage output bus exceeding a second threshold, higher than said first threshold, to couple said voltage output bus to said flyback circuit, so as to couple energy from said voltage output bus into said flyback circuit, and wherein, in response to said voltage on said voltage output bus dropping to less than said second threshold, said flyback circuit is operative to transfer energy stored therein to said voltage input bus.

2. The voltage transient compensation circuit according to claim 1, wherein said flyback circuit comprises a flyback transformer having a first inductor

winding coupled between said voltage output bus and said second switch circuit, and a second inductor winding mutually coupled with said first inductor winding, and being coupled between said second switch circuit and said voltage input bus.

3. The voltage transient compensation circuit according to claim 2, wherein said first switch circuit comprises a first MOSFET coupled between said voltage input bus and said voltage output bus, and a first comparator having a first input coupled to a first voltage corresponding to said first threshold and a second input coupled to said voltage output bus, said first comparator having an output coupled to control the operation of said first MOSFET.

4. The voltage transient compensation circuit according to claim 3, wherein said second switch circuit comprises a second MOSFET coupled between said voltage output bus and said first inductor winding, and a second comparator having a first input coupled to a second voltage corresponding to said second threshold and a second input coupled to said voltage output bus, said second comparator having an output coupled to control the operation of said second MOSFET.

5. A voltage transient compensation circuit for use with a DC-DC converter having a voltage output bus

to which a load powered by said DC-DC converter is coupled, comprising:

a current supply circuit coupled between a current supply and said voltage output bus and being operative, in response to a voltage on said voltage output bus dropping below a first threshold, to couple said current supply to said voltage output bus, and thereby supply current to said voltage output bus and said load; and

a current sinking circuit, coupled between said voltage output bus and said current supply, and being operative, in response to a voltage on said voltage output bus exceeding a second threshold, higher than said first threshold, to couple energy from said voltage output bus into said flyback circuit, and wherein, in response to said voltage on said voltage output bus dropping to less than said second threshold, said flyback circuit is operative to transfer energy stored therein to said current supply.

6. The voltage transient compensation circuit according to claim 5, wherein said current supply circuit comprises a first switch circuit coupled between said voltage input bus and said voltage output bus, and a first comparator having a first input coupled to a first voltage corresponding to said first threshold and a second input coupled to said voltage output bus, said first comparator having an output coupled to control the operation of said first switch circuit.

7. The voltage transient compensation circuit according to claim 6, wherein said current sinking circuit comprises a second switch circuit coupled between said voltage output bus and said first inductor winding, and a second comparator having a first input coupled to a second voltage corresponding to said second threshold and a second input coupled to said voltage output bus, said second comparator having an output coupled to control the operation of said second switch circuit.

8. The voltage transient compensation circuit according to claim 7, wherein said flyback circuit comprises a flyback transformer having a first inductor winding coupled between said voltage output bus and said second switch circuit, and a second inductor winding mutually coupled with said first inductor winding, and being coupled between said second switch circuit and said current supply.

9. For use with a DC-DC converter having a voltage output bus to which a load powered by said DC-DC converter is coupled, a method for compensating for a voltage transient on said voltage output bus, comprising the steps of:

(a) in response to a voltage on said voltage output bus dropping below a first threshold, coupling a current supply to said voltage output bus, and thereby

supplying current to said voltage output bus and said load; and

(b) in response to a voltage on said voltage output bus exceeding a second threshold, higher than said first threshold, coupling said voltage output bus to a flyback circuit and wherein, in response to said voltage on said voltage output bus dropping to less than said second threshold, causing said flyback circuit to transfer energy stored therein to said current supply.

10. The method according to claim 9, wherein said flyback circuit comprises a flyback transformer having a first inductor winding coupled between said voltage output bus and a voltage reference terminal, and a second inductor winding mutually coupled with said first inductor winding, and being coupled to said current supply.